REVISED DISCUSSION DRAFT

A PARTICIPATORY APPROACH TO BIODIVERSITY CONSERVATION: THE REGIONAL PRIORITY SETTING WORKSHOP

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Abstract: The last five years have seen a rapid proliferation of new funding and mechanisms for biodiversity conservation in the tropics. One of the most pressing challenges facing the international community and indeed all decision-makers in this area is the need to set priorities for conservation investments in the absence of complete information. Over the past decade, a number of approaches to priority setting at the global level have been developed, and have focused attention on high priority ecosystems around the world. Now the emphasis needs to be at the regional, national and local levels, where priority setting can be directly linked to conservation action. The Regional Priority Setting Workshop approach is proposed as an appropriate method for determining biodiversity conservation priorities at these levels. This Workshop approach emphasizes high quality biological data and stimulates an expert-based, consensus-building process that creates a constituency to ensure that its recommendations will be implemented. It also bridges the gap between the fragmentary nature of current understanding of biodiversity distribution, patterns and processes, and the need for a decision-making mechanism which rapidly instructs investments in conservation. Two workshops of this kind, one at the continental level (Latin American and the Caribbean) and one at an ecosystem level (Northeastern Atlantic Forest of Brazil) are described as examples of how this approach can work.

Resumen: En los últimos cinco años se ha visto una rápida proliferación de nuevos fondos y mecanismos para la conservación de la biodiversidad en los trópicos. Uno de los desafíos que más presionan a la comunidad internacional y a los responsables de tomar decisiones sobre ésta área es la de establecer una línea prioritaria de financiación de la biodiversidad, a pesar de la actual ausencia de información. Desde la última década se desarrollan diferentes enfoques para determinar prioridades a nivel global concentrados en ecosistemas de alto riesgo. El énfasis actual necesita dirigir el enfoque a nivel regional, nacional y local, donde las prioridades para conservación puedan ser directamente conectadas a las acciones. El taller de trabajo sobre prioridades de conservación se presenta como un método apropiado de determinar estrategias para la conservación de la biodiversidad en estos niveles. Estos talleres son productos de una fuerte base científica que mediante la presentación de datos biológicos genera un consenso que garantiza que los resultados y recomendaciones se lleven a cabo. De la misma manera que establecen un puente entre la naturaleza fragmentada de la biodiversidad, patrones y procesos, así como la necesidad de que se implementen mecanismos que puedan rápidamente instruir inversiones para la conservación. Dos talleres de este tipo, uno a nivel continental (Latinoamérica y el Caribe) y otro a nivel de ecosistema (Floresta Atlántica del nordeste de Brasil) son descritos como ejemplos de la aplicación de esta metodología.

I. INTRODUCTION

The challenge of maintaining a viable global biological resource base is becoming an increasingly prominent concern. We now face a series of potential, and possibly already ongoing, extinction spasms unlike anything since the disappearance of the dinosaurs 65 million years ago (see *e.g.* Myers, 1979, 1983, 1984, Wilson, 1988, 1992). Indeed, we are at risk of losing not just single species or communities of different species, but entire ecosystems upon which we ultimately depend for our own survival. Countering this, we have seen greatly increased international attention to biodiversity over the last five years, which has clearly been a positive development. Nonetheless, much more needs to be done and emphasis must be placed on translating good political intentions and high level rhetoric into concrete, science-based action in the field.

The 1992 Earth Summit produced a number of significant initiatives for biodiversity conservation. The most visible output was the Convention on Biological Diversity, a document signed by some 165 nations. Concurrent with the Convention negotiations was the development of Agenda 21, an exhaustive list of good intentions, implementation of which was to be overseen by the new U.N. Commission on Sustainable Development (CSD). Perhaps more important was the creation of the Global Environment Facility (GEF), a $2 billion global fund for biodiversity conservation and other environmental priorities. These new mechanisms are just now gathering momentum. The GEF has recently completed a yearlong restructuring and financial replenishment exercise, during which a significant number of strategic changes were proposed (see *e.g.* Bowles and Prickett, 1994) and is now developing an operational strategy, which will build on guidance from the Convention, the GEF's Independent Evaluation and a series of regional consultations. The CSD is preparing for its 1995 session, which will include biodiversity as an agenda item. The Biodiversity Convention itself has recently held its first formal Conference of the Parties meeting in November/December, 1994 in the Bahamas.

One of the most pressing issues facing the Convention, the GEF and other initiatives seeking to address the needs of biodiversity conservation is how to set priorities for action on the global, national, regional and local scale in a participatory and transparent manner. Many proposals and methods for setting biodiversity priorities have been advanced and/or tested in recent years (*e.g.* Myers, 1988; Mittermeier, 1988; ICBP, 1992; Mittermeier and Goettch de Mittermeier, 1992; Dinerstein and Wikramanayake, 1993; Sisk, et. al, 1994; WCMC, 1994) These range from individual studies conducted at the global level, emphasizing biologically diverse biomes currently under severe threat, to exercises focusing on a particular set of ecosystems.

In this paper, we begin with a review of top-down approaches to priority setting. We then discuss in detail the Regional Priority Setting Workshop approach, using one recent ecosystem-level (Northeastern Brazilian Atlantic Forest) and one continental-level (Latin America and the Caribbean) exercise as examples. We believe that this approach is a particularly powerful one because it emphasizes use of high quality biological data, which must be the basis for biodiversity priority setting, and because it provides for a participatory, expert-based, consensus-building process that creates a constituency that ensures its recommendations will be implemented. Furthermore, the Regional Workshop method adequately bridges the gap between the fragmentary nature of our current understanding of biodiversity distribution, patterns and processes, and the need for a decision-making mechanism which rapidly instructs investments in conservation.

II. A REVIEW OF GLOBAL APPROACHES TO PRIORITY SETTING

The biological resources of every nation are critically important to its survival and worthy of conservation by every means possible. Nonetheless, biodiversity is by no means evenly distributed over the planet. Certain areas are far richer than others in

overall diversity and in endemism and threats to this diversity vary in intensity as well. These facts, reinforced by the irreversible nature of biodiversity loss, make priority setting imperative.

The tropical rain forest, most species-rich of the terrestrial biomes, provides us with a clear example. Recent estimates indicate that as much as one half of the original humid tropical forest has disappeared and about one-quarter of the remainder is degraded (Johnson and Cabarle, 1993), with some nations and regions (*e.g.*, Madagascar, the Philippines, the Atlantic forest region of eastern Brazil) already having lost 80-95+% of original forest cover. The example of the temperate rain forests of the world is similar or even more extreme. Once found in 10 different regions of the world, these forests are now restricted mainly to the Pacific Northwest of the United States, British Columbia and southern Alaska, with other areas in southern Chile and New Zealand's South Island and Tasmania, roughly 45% of what once existed worldwide (CI/Ecotrust, 1992).

In this section, we discuss several methods of global priority setting that have been employed by a range of institutions.

A. Threatened Hotspots

A number of methods exist for setting biodiversity conservation priorities. Of these, perhaps the best known and most widely used is the "threatened hotspots" approach, first conceived of by Norman Myers (1988) and subsequently revised by Myers (1990).

This first approach is terrestrial in focus and concentrates mainly on tropical rain forests. In its latest form, the threatened hotspots analysis (CI, 1992) recognizes some 15 top priority tropical rain forest regions biodiversity that occupy only about 4% of the land surface of the planet, yet harbor roughly 30-40% of all terrestrial species diversity and a much higher (but as yet undetermined) percentage of species at great risk. Although still a very preliminary analysis, the "hotspots" have provided very useful guidelines for action.

Although subject to much criticism over the past few years, the "threatened hotspots" were groundbreaking when they first appeared and helped to focus a great deal of conservation action. Furthermore, although they were not totally comprehensive, none of the areas recognized by Myers as being top priorities has proven to be incorrect. In addition, an important principle basic to the "threatened hotspots" approach is first the recognition of biological value and secondarily (but at a 1:1 weighting) the superimposition of information on threat.

While hotspots were first applied to tropical forest priorities, other major terrestrial biomes are also repositories of significant amounts of terrestrial biodiversity, such as dry forests, temperate rain forests, boreal forests, grasslands, wetlands, deserts, Mediterranean-type systems, mangroves, etc.). Myers himself recognized this in his 1990 paper, which provides a rough cut at priorities for some of these biomes as well (Myers, 1990).

Another similar approach is Birdlife International's (formerly the International Council for Bird Preservation,) analysis of biodiversity priorities based on areas of endemism for birds. This excellent study, entitled *Putting Biodiversity on the Map: Priority Areas for Global Conservation* (ICBP, 1992), provided a much more fine-grained "hotspots" type approach that categorizes 221 "endemic bird areas" into critical, urgent or high priority.

B. Megadiversity Countries

Another way of looking at biodiversity priorities is by political units, in this case nations. The megadiversity country approach, first developed by Mittermeier (1988) recognizes that a relatively small number of countries, some 12 out of a total of 194 that currently exist, are home to an inordinately large share of the world's biodiversity and therefore have tremendous responsibility for this resource. Indeed, some very rough estimates indicate that these countries may have on the order of 60-70% of the planet's diversity within their borders, including not just terrestrial diversity, but freshwater and marine as well.

Several countries stand out as truly superlative, with Brazil, Indonesia, Colombia and Mexico topping the list, and others like Peru, Ecuador, Zaire, Madagascar, China, India and Australia following

close behind. Most of the megadiversity countries are large, but several like Madagascar and Ecuador pack high diversity into relatively small land areas. Since conservation projects and programs are usually conceived of, financed and executed at the national level (whole biomes do not often coincide with states and governments), the megadiversity country approach is indeed a powerful one. In any case, whether large or small, the issue of a high level of international responsibility remains a key point of the megadiversity approach, and focuses national and international attention on the special biological wealth possessed by these countries. It has also been adopted by and has generated considerable enthusiasm in several of these top priority countries. However, it should be recognized largely as a packaging and marketing device aimed principally at stimulating more enthusiasm for biodiversity in key countries, not as the final answer in priority setting. It is also not intended to serve as triage, i.e. only these countries are worthy of attention and the rest can be forgotten. Properly used, it has been and should continue to be helpful in making some key points.

C. Major Tropical Wilderness Areas

Focusing again on tropical forests, the other end of the spectrum from hotspots are the major tropical wilderness areas, referred to as the "good news areas," by Myers (1988) and highlighted in the global wilderness survey of McCloskey and Spalding (1989). More recently, Hannah *et al.* (1994) have provided a comprehensive review of such remaining natural areas in their "human disturbance map." Whereas hotspots consist mainly of heavily exploited ecosystems often highly fragmented and greatly reduced in original extent (usually 2-20% of original habitat remaining), the major tropical wilderness areas are those few large blocks of tropical forest that remain mostly intact.

These wilderness areas are important for a number of reasons: they are essential for the maintenance of relatively unaltered ecological processes, have great importance as storehouses of biodiversity, as major watershed areas, and as controls against which we can measure the management of the more devastated hotspots; they are often the last places where indigenous people have any hope of maintaining a semblance of their traditional lifestyles; and they are likely to assume increasing recreational, aesthetic and spiritual value on an ever more overcrowded planet. Among the major wilderness areas that still exist are the southern Guianas, southern Venezuela and adjacent parts of extreme northern Brazilian Amazonia; parts of the upper Amazon in Brazil, Colombia, Ecuador, Peru and Bolivia; the Zaire Basin in Central Africa; and much of the island of New Guinea. Although still largely undisturbed, these areas have come under increasing pressure just in the past one to two years. Suriname, for example, is almost literally on the auction block with three million hectares (or roughly one fifth of the country) possibly being sold to Asian multinational companies for logging concessions; a major chunk of neighboring Guyana is already in the hands of concessionaires.

D. Human Utility

Yet another approach that has been used to set biodiversity priorities is that of the centers of origin and/or diversity of major crop species, focusing on those agricultural resources that are of greatest use to our own species. This is a modified version of the Vavilov centers. These regions include both areas where our key crop species originated (and where the wild ancestors come from) and those that have the greatest diversity of other wild relatives of these species. Sometimes these areas coincide, but occasionally they are different, as in the case of coffee, which originated in the highlands of Ethiopia and East Africa, but achieves great diversity of wild relatives in the eastern rain forests of Madagascar. Often these centers fall within the borders of megadiversity countries *(e.g.*, Mexico) or coincide with hotspots (*e.g.* Tropical Andes or Upper Guinean Forest), but in other cases they differ. Although a limited approach that focuses only on a handful of widely used species, it demonstrates clearly the value of biodiversity to the daily needs of our own species.

E. Global Lists

Another important recent initiative is that

of the World Conservation Monitoring Centre (WCMC) entitled *Priorities for Conserving Global Species Richness and Endemism* (WCMC, 1994) produced for the British Overseas Development Administration. This study makes the case that the Convention should establish its priorities based on a list (or series of lists) of global distribution of biodiversity. The WCMC document reviews a number of existing approaches to priority setting, makes important suggestions about options for biodiversity management and publishes an up to date list of species richness and endemism in major taxonomic groups organized by national boundaries. The paper then divides nations into different groups based on these lists.

WCMC has also advanced the potentially important idea of "countries of ultimate responsibility" that identifies species endemic to one country. (WCMC, 1994). This concept builds on the idea of global lists of endemic species and discusses the concept of "political endemism."

F. Conservation Potential / Threat Index

More recently, other methods have been proposed, focusing on attempts to estimate the ecological viability of major ecosystems, given their rates of deforestation, degree of fragmentation and representation in protected areas systems (Dinerstein and Wikramanayake 1993). This approach has been termed the Conservation Potential/Threat Index (CPTI).

The CPTI approach merits further discussion in this paper because it is currently being discussed by a major development assistance agency, the World Bank, as the foundation for identifying its biodiversity conservation investment priorities for Latin America (Olsen and Dinerstein). In our view, the CPTI approach introduces some welcome elements to the host of analytical tools to be used in setting biodiversity conservation priorities. The CPTI method brings in important conservation biology applications to the process of priority setting, particularly degree of fragmentation and estimates of ecosystem viability. This process provides one way to address the important threat parameter to setting priorities.

One drawback we see to emphasizing degree of fragmentation is that, while landscape integrity is an essential layer of priority setting analysis, this approach is largely deterministic, downplaying the dynamic nature of the threats to biodiversity. For instance, the study by Dinerstein and Wikramanayake (1993) assumes that the size of the park system and the rates of deforestation in the Indo-Pacific region will remain constant for at least a decade. This is not a valid universal assumption. In Brazil, for example, the process of establishing public parks and reserves can be best described as a series of quantum leaps interspersed by periods of relative inactivity. On the same token, deforestation rates in the Brazilian Amazon have decreased significantly from the 1980s to the early 1990s, despite earlier catastrophic projections. On the other hand, the largely intact tropical forests of Guyana and Suriname are now facing the imminent threat represented by forest concessions awarded to Asian logging companies. Therefore, there is a need to be cautious in the interpretation of the results of methods placing heavy emphasis on these ever changing parameters, at the expense of the more parsimonious considerations linked with distribution of biodiversity.

The World Bank is drawing heavily on the CPTI approach proposed by Dinerstein and Wikramanayake (1993), with the unfortunate simplification of disregarding biological value data (Olson and Dinerstein, 1994), represented by patterns of species distribution, richness and diversity. Instead, the World Bank approach places greater emphasis on the current degree of fragmentation of the natural landscape. We feel this is an unfortunate decision, given that the same development agency which in the past has funded programs which resulted in widespread habitat degradation in many areas extremely important for biodiversity (i.e. the much-publicized Polonoroeste project in Rondonia, Brazil) is now planning to use a methodology that in many instances will write off these same areas from their biodiversity investment portfolio. Furthermore, such an approach would devalue highly diverse, yet fragmented areas like northern Colombia, in favor of less disturbed systems that may be biologically less important. The

World Bank-sponsored methodology also goes further envision a quantitative matrix of threat and opportunity that will guide investments. The problem we see with such an approach is that it mixes too many dissimilar variables and does not end up with a transparent process for setting priorities.

This method argues that "The spatial correlation between richness and endemism in unclear, signaling a cautious use of them as conservation parameters" (Olsen and Dinerstein, 1994). While we concede that patterns of species richness and endemism may not always have been produced by the same underlying mechanisms, we simply cannot agree that cautious use of them has to mean no use at all. Apart from leaving aside the set of data which most clearly addresses the challenge of conserving biodiversity, we also feel that the framework sends the wrong message to governments, downplaying the role of biological inventories and field research in conservation planning. In addition, the method assumes that "all ecoregions have intrinsic biological value,..." (Olsen and Dinerstein, 1994) a valid assertion, but one which veils the very fact that biodiversity is unevenly distributed. A more suitable variant of this method is represented by a recently proposed analytical tool, developed by the Center for Conservation Biology at Stanford University (Sisk et al., 1994), which takes into consideration threat factors as well as species richness and endemism. Regardless of its drawbacks, the World Bank/CPTI project has made a significant contribution to the host of priority setting tools through its refinement of the ecoregions of the Neotropics.

III. THE REGIONAL PRIORITY SETTING WORKSHOP APPROACH - BUILDING CONSENSUS FOR BIODIVERSITY CONSERVATION

The foregoing discussion focuses primarily on the global level and top-down approaches to priority setting. These top-down approaches have been and will continue to be useful for funding agencies, providing a first cut on the major biodiversity priorities. However, rather than continuing to refine these ad nauseum, the focus should now be on improving the resolution of analyses at the regional, national and sub-national levels. This bottom-up approach will make it possible to identify more precisely the specific targets for more field-based conservation action, the principal element that is still lacking in most of the recent major international biodiversity efforts. Furthermore, emphasis must be placed on creating bottom-up processes that will gather political and institutional support and thus guarantee follow up implementation.

In this section, we discuss a methodology that a range of organizations have developed as a conservation tool: the Regional Priority Setting Workshop approach for determining priorities at the national and regional (or biome) level. In the remainder of this paper, we discuss the workshop approach in general terms and then describe two recent exercises at the continental and biome level as examples.

A workshop can look at a biome encompassing several nations, a political unit like a country, or a regional subset of an ecosystem. This method consists of pulling together the published biological and socio-economic data, cartographic information and satellite imagery prior to a meeting, and then refining this information in a workshop format involving the leading experts on that particular region.

This technique attempts to address several elements required for biodiversity conservation: (1) to generate an easily understandable assessment and mapping of biodiversity resources; (2) to organize and disseminate such data; (3) to assess potential and current human impacts on biodiversity, (4) to set conservation priorities through a bottom-up participatory process based on broad consensus-making, and (5) to help develop local capacity in conservation planning and management based on the development and establishment of an integrated conservation information system and related training.

Such workshops have already taken place for the Amazon basin (Workshop 90, Manaus, see Figure 1), Papua New Guinea (1992, see Figure 2), the Northeastern Atlantic Forest (1993), and are in process for several other regions and countries like Madagascar, the Brazilian Cerrado and southern Atlantic Forest of Brazil.

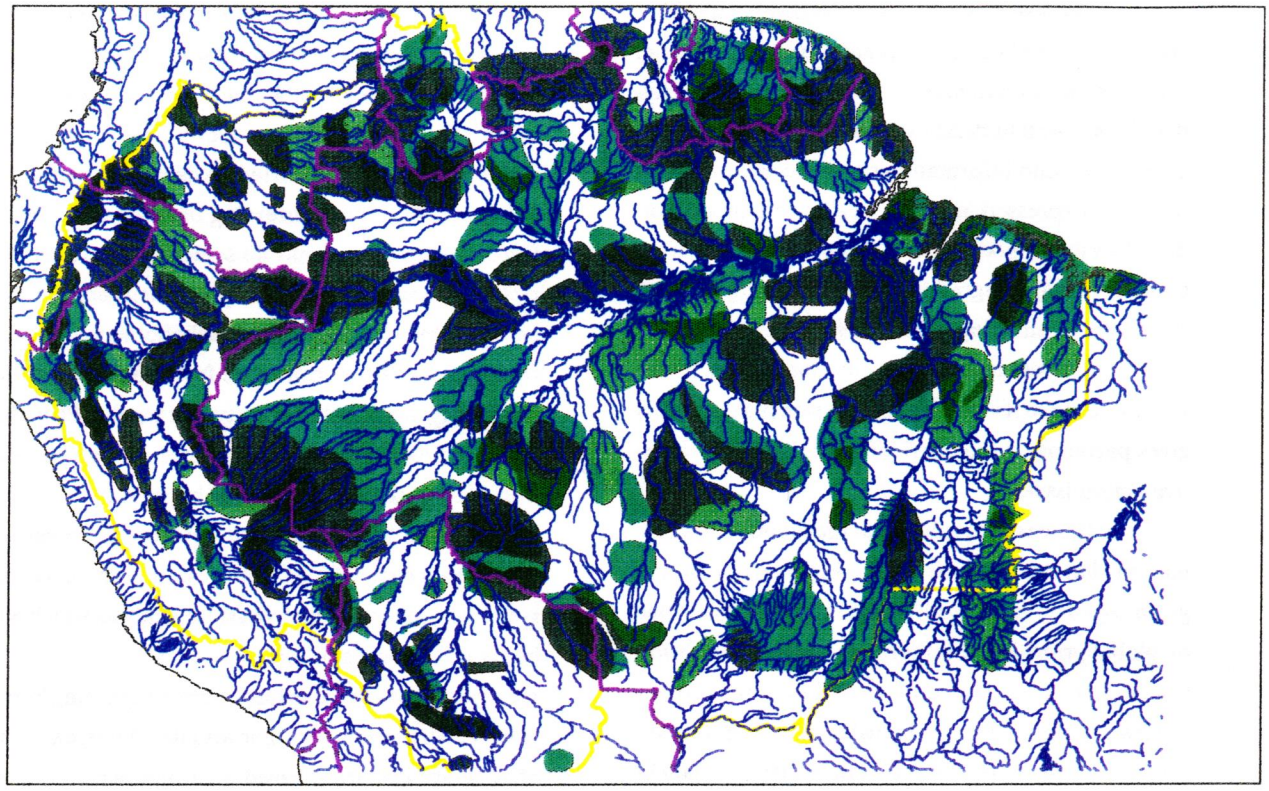

Figure 1. Amazon Basin (Workshop 90) biodiversity priorities.

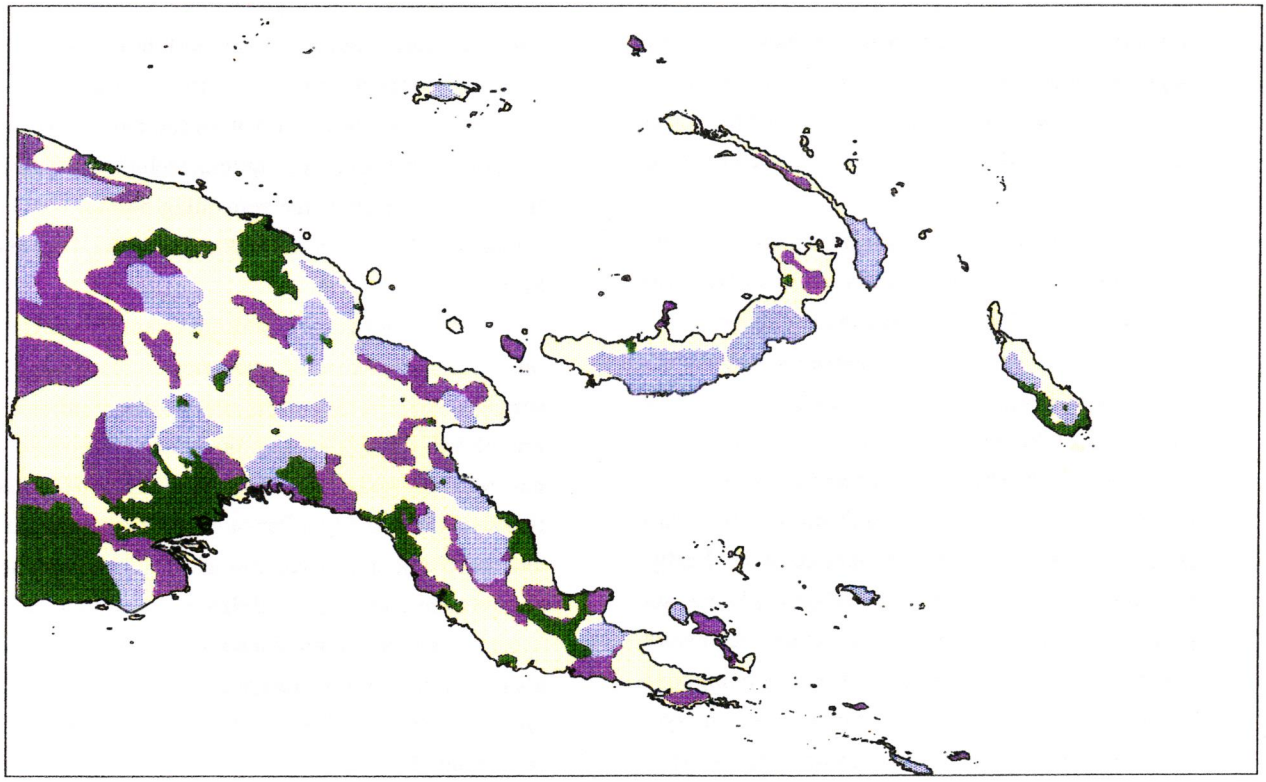

Figure 2. Papua New Guinea biodiversity priorities.

A. Rationale

Biodiversity is a specialized subject with a fairly small number of top quality experts available. Whereas the need to make biodiversity conservation decisions is well understood, making decisions in the absence of good information poses a concern in that opinions expressed may be challenged or contradicted by experts with access to little known sources of data. A major ingredient in the workshop process therefore is ensuring that investment is made to compile the best information on biodiversity in advance and make it available for decision making. This gives participants the confidence to discuss substantive action issues.

It is easy to realize that the amount of information that we do have on the biodiversity of any given region is vastly insufficient to draw conclusions on global priorities. Furthermore, most information has been generated by research activities that do not ensure a balanced base of knowledge of biodiversity. This is the main reason why the compilation of data in different themes is not sufficient for understanding the main issues concerning biodiversity and for setting priorities for action. It is important at this stage to develop an inter-disciplinary, expert-based approach to understand what we know -- and want we don't know -- of the biodiversity of a region and what might be the critical issues we need to face in ensuring long-term conservation and use of this diversity. This can be accomplished through the expert/workshop model.

No matter how much information is gathered prior to a priority setting exercise, in most cases the assessment of the information available will conclude that it is insufficient to achieve the stated goals without a substantial investment in future research. The level of knowledge of biodiversity is clearly limited even in the best studied ecosystems. Furthermore, existing knowledge is highly uneven, both on a geographic as well as on a taxonomic basis. Lastly, few studies advance an integrated or landscape approach to the ecosystem. The workshop framework overcomes some of these limitations by combining two basic strategies: a thorough compilation and synthesis of data into a common information system, followed by an expert analysis of existing information. The expert phase includes an assessment of the completeness and quality of the array of existing data, as well as the level of knowledge for a particular ecosystem. Furthermore, experts help identify key issues as essential parameters to decide on the appropriate strategies for conserving biodiversity. Therefore, experts do not end up selecting priorities, but rather advance a framework upon which decisions can be made by a varied host of stakeholders and decision-makers. These can range from government and funding agencies to the society as a whole. Provided that the process is fully transparent, it can be constantly revisited, corrected and improved.

The model we have developed for setting priorities is derived from a more comprehensive and systemic framework to ecosystem analysis which will be described in detail elsewhere. Starting with the most pertinent available information regarding biodiversity distribution, together with the biological value of geographical areas based on a number of parameters, particularly level of endemism and taxonomic diversity, the process can proceed to the next step and examine trends related to the vulnerability and resilience of the different systems/areas being evaluated. This step can be named threat analysis and deals with two main issues: the current status of the ecosystem or resource and the dynamics of its use and conservation. The first aspect usually involves the analysis of the level of integrity of the ecosystem, including fragmentation and quality of the remaining habitat (for instance, see Dinerstein and Wikramanayake, 1993 and Sisk et al., 1994).

The third aspect pertains to human pressure on a given resource or ecosystem. At the most simplistic level, trends on population distribution and growth will roughly suggest the current demands on natural resources. However, population analysis at this level is not enough. Per capita consumption rates and specific details on technologically dependent demands upon ecosystems (Ehrlich and Holdren, 1971) -- parameters which are constantly changing -- must also be thoroughly investigated. One other factor largely independent of population is trade, particularly related to regional and global markets. An

example can be found in the ever growing number of timber extraction concessions being negotiated in the Neotropics. Lastly, there are a number of other issues which need to be addressed, namely legal and institutional frameworks on a regional and national basis. All of these aspects, however, have been poorly dealt with for most regions throughout the world. Therefore, there is a basic lack of information which makes it virtually impossible to deductively define priorities. We thus advocate a framework which provides for the best synthesis of information, followed by expert consensus on gaps and expected priorities.

Broad participation is essential for biodiversity priority setting for scientific, social, and political reasons. A large proportion of the needed conservation actions can only be successful with the agreement or active cooperation of local and regional communities. However, much biodiversity information is either unpublished or disseminated primarily at the local or regional level. Furthermore, technical capacity and resources are often scarce in high biodiversity areas, which are typically remote and face multiple economic challenges. This makes a strong case for involvement of national and international resources to help set biodiversity priorities. The workshop approach tries to explore the potential for this type of synergy, in an even-handed setting where all participants bring something to the table and recognize the need for collaboration. Another, and perhaps more important reason for broad stakeholder participation, is the opportunity to use the workshop to increase capacity to carry out the proposed conservation actions, while still providing a realistic assessment of their feasibility.

Once started, the workshop methodology quickly takes on a bottom-up approach. *Even when initiated by national or international organizations, the process only becomes possible when local partners are convinced of the utility of this method for addressing their perceived biodiversity priorities.* This participatory element also helps make workshops stimulate further initiatives at finer scales, conducted by participants with the experience acquired at the biome-level projects. To support such follow up activities, data dissemination in an easy-to-use format is essential. The workshop products are targeted with this purpose in mind. Map posters are printed on front and back, to communicate as much information as possible. All maps and databases are made available in digital format using a Geographical Information System (GIS). It is fairly straightforward to convert the maps to other formats, so that users have flexibility in choosing their database and GIS approaches.

To date, all such workshops have involved primarily biologists. This reflects the principal purpose of organizing a highly dispersed body of biodiversity information, obtaining consensus between experts of different disciplines on the areas of high overall biodiversity, and defining broadly the types of conservation action required. However, in recent cases, the focus has evolved to designing effective multipurpose actions that address both biodiversity conservation and socioeconomic well-being in these priority areas.

To integrate the workshop program into the broader context, several approaches are underway. For instance, the Brazilian GEF biodiversity project includes a set of biome-level priority setting workshops as the first phase of the development of the National Biodiversity Program, together with the provision of a Biodiversity Information Network and the establishment of a council structure for setting a national biodiversity policy with the participation of government ministries, scientists, NGOs, community representatives, and the private sector. The first workshop in this project, to be conducted in collaboration with the Brazilian NGO FUNATURA, will be on the Brazilian Cerrado, the agricultural frontier of Brazil and also one of the world's richest tropical woodland/savanna ecosystems, covering over 2 million sq. km, or roughly one quarter of the country.

B. USAID Workshop

The first workshop example we will discuss is the one recently conducted for the U.S. Agency for International Development (USAID). USAID is the largest bilateral donor for biodiversity conservation programs. Its annual budget for biodiversity conservation and tropical forest protection is approximately $150 million. Since 1987, USAID's biodi-

versity programs have grown in certain key countries like Madagascar, Bolivia, Guatemala, Mexico, Indonesia and a number of others; but their distribution has not been based explicitly on a scientifically-based priority setting framework. In early 1994, facing increasing Congressional pressure to close out a number of its missions, USAID began a ground-breaking process to determine which areas were of greatest importance for its biodiversity conservation investments, including those that were of such great significance that USAID might invest there even following a mission closing.

In September 1994, following six months of consultations and two months of preparatory activities, USAID convened a priority setting workshop to identify biodiversity conservation priorities for Latin America and the Caribbean. Organized by a working group of the World Resources Institute, Conservation International, the World Wildlife Fund, the Nature Conservancy and the Wildlife Conservation Society, and coordinated by the USAID-funded Biodiversity Support Program, the meeting was attended by some 70 experts from throughout the region.

The approach built on the previous experience of these institutions in using a range of approaches to priority setting and used the basic workshop approach of a first phase of intensive data compilation and synthesis followed by a one-week workshop. The results of the exercise showed that the two highest priorities for tropical forests were the most important South American "threatened hotspots" identified in 1988 by Myers: the Brazilian Atlantic Forest and Tropical Andes. On the other hand, the USAID workshop brought in some welcome innovations to the process. Perhaps the most significant of these was the comprehensive screening of biological value (species diversity and endemism) and threat parameters for all biomes in Latin America and the Caribbean, which in the end ensured the *representation of each major habitat type* in the final set of priorities.

For instance, different lowland tropical moist forest ecosystems were compared only with one another, and not with other drier, less species-rich systems. The same was done for tropical dry forests, montane tropical moist forests, xeric systems, herbaceous lowland grasslands, herbaceous montane grasslands and temperate forests, and a special analysis was done for freshwater aquatic systems. In essence, the exercise looked for "hotspots" within each major habitat type. As a consequence, biomes such as the Cerrado of central Brazil and the temperate forests of Chile for the first time made it to the top of biodiversity priority lists. Furthermore, Myers "good news" areas concept was also applied, through recognition of the appropriateness of including relatively intact areas in the final cataloguing of conservation priorities.

This exercise also advanced some potentially interesting concepts for priority setting such as policy and institutional data and human utility parameters. Unfortunately, the continental scale data base available for this workshop was insufficient to draw conclusions as to the usefulness of these variables in the decision-making process. Therefore, for the former level of analysis, the USAID exercise relied on expert opinion. This further reinforces the power of expert-based methods in many situations in which available information is either heterogeneous in quality or too coarse-grained, or otherwise unavailable.

This workshop employed a transparent stepwise analysis, having as groundwork biological value parameters generated with data on the distribution of plants, mammals, birds, reptiles and amphibians, invertebrates, and fish. After sorting out this pool of data used to determine the biological priorities for Central and South America and the Caribbean, other layers of information were analyzed. The second layer consisted of assessing the degree of threat for each ecounit of analysis, in addition to pinpointing the "major wilderness areas" of the region, Finally, the notion of making use of yet other layers of useful information, such as policy and institutional considerations, in addition to the utility of biodiversity to people, emerged as potentially viable ideas for future exercises,

The final product is a characterization of all natural areas in the region following several indices grouped under biological value, level of threat or vulnerability, utility, and institutional capacity, which

allows the user to analyze not only global priorities within the region, but also the main challenges or opportunities facing a given project in any area of the region.

The USAID initiative also advanced two somewhat similar methods and criteria for integrating the different layers of information, which in the end resulted in lists of Neotropical priority areas for biodiversity conservation according to expert opinion of the workshop participants. On the other hand, the final choices of the appropriate method of integration, including the relative weighing of the different parameters, were left to the end-users, who will not be constrained by the lists of priorities produced during the exercise. Furthermore, the analyses can be disaggregated back into their original components, providing for adjustments, corrections and additions, and allowing for future updating of the priorities once new information becomes available. The final result is thus flexible and transparent enough to be used by a wide range of organizations, while at the same time helping USAID decide on how to focus its biodiversity conservation investments.

C. The Northeastern Atlantic Forest Workshop

The Atlantic Forest of Brazil, once covering more than 1,000,000 square kilometers, is one of the worlds richest tropical rain forests, with some of the largest concentrations of endemic plants and animals However, this region is also the most heavily populated in Brazil, home to the country's major cities, and the focus of much economic activity, such as agriculture (*e.g.* coffee, sugarcane, cocoa) cattle ranching, logging, mining, and, in this century the creation of large industrial steel and petrochemical complexes.

With extended and heavy human impact, over 90% of the landcover in this region has been transformed by human action. The new Brazilian Constitution, enacted in 1988, designates the Atlantic Forest as a national heritage, and recent legislation has restricted substantially the use of areas with natural vegetation. Zoning efforts are getting underway, and the Unesco Biosphere Reserve for the Atlantic Forest encompasses a number of discontinuous segments spread over more than 3000 km north to south as Reserves or Buffer Zones.

To further delimit the conservation status of the biome, the Atlantic Forest Consortium, an assembly of NGOs, is coordinating the production of detailed maps of the forest fragments in the region. While general conservation directives are becoming available and are useful, the need to set action priorities within this extensive region has been clear. One area that has deserved special attention is the northeastern portion of the Atlantic Forest, long recognized as the most devastated, but also the most overlooked in terms of conservation action. With this in mind, this area was chosen as the site for the first of a series of regional priority setting workshops in Brazil.

1. Workshop Design

The Northeastern Atlantic Forest Workshop was designed to provide a science-based assessment of the biological importance and conservation priorities for the remaining areas of forest and associated ecosystems in the Brazilian Northeast (including coastal sand dune forests, mangroves, and the humid forest enclaves in the semi-arid interior). The workshop process followed closely the scheme depicted in Figure 4. Since this is part of a larger initiative to generate a biological assessment for the whole country, the methodology and the data-gathering process were adjusted to tie in to previous efforts in other regions (Workshop 90 in Amazonia) and future initiatives in other parts of Brazil (Central Brazilian Cerrado, Southern Atlantic Forest). The decision to split the Atlantic Forest assessment into northeastern and southern components was based on biogeographic criteria, land use patterns, and workshop feasibility. The biogeographic criterion is widely supported by data for various plant and animal groups, which show distinctive forms and areas of endemism in the northeastern and southern regions of the biome. From a land use, political, and socio-economic perspective the Northeast is also very different from the Southeast and South. The feasibility criterion was determined by pre-workshop preparation time and resources available, quantity of data required, maximum number of participants (70), and budget. All

criteria indicated that analyzing separately the Northeastern and Southeastern and Southern regions of the Atlantic Forest was biologically consistent and made good use of the limited resources available.

The workshop was organized by three institutions, joined by a common expertise in biodiversity studies and with different strengths. CI provided scientific expertise, funding, previous experience in workshop methodology, equipment for computerized mapping and analysis, and a GIS software it developed for natural resource applications (CISIG). Fundacao Biodiversitas, based in Belo Horizonte, Brazil, has been a leader in the compilation of biodiversity databases on the Atlantic Forest, as well as conducting wide-ranging field surveys on endemic and endangered species in the region. The Northeastern Ecological Society (Sociedade Nordestina de Ecologia - SNE), based in Recife, Brazil, has been coordinating the mapping of the Northeastern Atlantic Forest, and is actively involved in issues of sustainable development and conservation of natural resources. All institutions had substantial material to contribute to the Workshop process. The bulk of the resources for the workshop were provided by the U.S.-based MacArthur Foundation.

2. Preparation

Workshop preparation started about eight to ten months before the event. A coordinating committee was formed with representatives of the organizing institutions and a scientific coordinator, who started work on the terms of reference for the workshop and the expected products. The main purposes of the workshop were an analysis of the existing biodiversity information, integration of biodiversity and socio-economic diagnostics, and generation of overall consensus biodiversity priorities that could be explicitly linked to the data and expert opinions.

The pre-workshop data collection was directed to obtaining the biodiversity information, mapping the remaining Atlantic Forest in the Northeast, and presenting the data in a form that would permit easy comprehension and modification by workshop participants. The purpose of advance preparation was twofold: on the one hand, provide workshop participants with baseline data and analyses in which to insert/complete/edit their own datasets; on the other, help them focus on translating the biodiversity information into a biological importance assessment. The data collection and analysis consumed a large portion of the pre-workshop time and budget. It involved obtaining, digitizing and printing computer maps of remaining forest and associated ecosystems, political units, land use, physical features (rivers, roads, coastline), vegetation, conservation units, among others. The socio-economic and biological data were compiled into databases and mapped by computer as well. These included demographic density, population changes over time, scientific knowledge as measured by the localities of surveys and studies, distributions for each of several hundred species of plants and animals classified as endemic, endangered, or of conservation concern, Pleistocene forest refugia, and centers of endemism, among others.

A bibliography of nearly 500 references was also compiled and indexed by computer. All this data was made available at the Workshop in one of three formats: large mylar-printed base maps of forest fragments, base physical and political borders, reserves and scientific knowledge; maps provided in a binder (vegetation, scientific knowledge by taxon, species richness, several demographic maps, 143 species distribution maps, and 350 references); and computer materials (two GIS softwares with capacity to analyze all the above maps and generate new ones through overlays, reclassifications, additions or deletions, lumping and splitting.)

3. Participants

A major task of the preparatory phase was the definition of the workshop process and participants. The pool of invited workshop participants included the experts who carried out the preparatory studies for each thematic group as well as a broader pool of specialists who could bring additional information, and examine, correct and validate data to be used during the workshop itself. Furthermore, a selected number of government representatives and NGOs was also invited to participate in the workshop process. The workshop mechanics were then planned as a three-stage process. In the first stage, participants were organized in seven thematic groups, six

biological (plants, mammals, birds, aquatic biota, reptiles and amphibians, invertebrates and fish) and one for socio-economic data, to identify biodiversity priorities over the entire region from their thematic perspective. In the second stage, integrative groups with participants from every thematic group took in-depth looks at the sub-regions within the biome, and used the thematic evaluations as a base to identify, generate biological importance and conservation priority scores, and plot the important biodiversity sites within the sub-region. In the third and final stage, all participants discussed the results for all sub-regions.

To provide the bridge between data organization and decision making during the workshop, each thematic group was led by a coordinator, who contributed data and analyses in his field of expertise beforehand, prepared a preliminary review paper for discussion at the workshop, and wrote the thematic report for the workshop proceedings. The coordinators were recruited five months before the meeting. Pre-workshop thematic data requested were:

(1) reviews of the state of knowledge in the subject for the northeastern Atlantic Forest;
(2) list of sites surveyed for biological inventories in the region;
(3) list of priority areas for new inventories;
(4) assessment of distribution and conservation status for species classed as endemic, rare, endangered, hunted or of economic importance in the region;
(5) location of important sites for conservation of endemic species, areas of high species richness, high species diversity, or harboring unique communities;
(6) preliminary list of priority areas for biological conservation, including description and limits; and
(7) circulation of this material among colleagues for pre-workshop analyses.

Workshop participants were invited to contribute to a thematic group, on the basis of their knowledge of the region, especially including unpublished sources and field experience, and the type of biodiversity or socio-economic expertise. All received a letter outlining the workshop objectives and indicating several expected products, of which the main ones were:

(1) Map of priority areas for biological conservation;
(2) Indication of biological importance of sub-regions and sites;
(3) Map of conservation urgency for biologically important sites;
(4) Socio-economic qualifiers of biodiversity valuation.

The first two products demonstrate integration of biological data, and the other two integration of biological and socio-economic data.

4. Process

The workshop was held in December, 1993 near Recife, the capital of Pernambuco, one of the most important northeastern states. The workshop lasted five days, with two days for thematic group discussions, two days for integrative group discussions, and a last day plenary for analysis of the final map. To document the workshop proceedings and support decision making, several techniques were used:

(1) Map and database support team. A GIS room was set up with all maps and computers, available for analyses and corrections of existing maps, and generation of new maps;
(2) Documentation support. All documents circulated were photocopied and filed for Workshop reference;
(3) Form-based decision documentation. All recommendations and priority designations made by thematic and integrative groups were captured on forms and on maps, to be transferred to computer;
(4) Frequent plenaries. The scientific coordinator circulated among groups, to assess the decision-making process. When required, plenaries were called to coordinate method ologies among groups;
(5) Decentralized decisions. The view of the organizers was that once the Workshop started, the participants should make the major decisions. The organizers role during

the meeting was as facilitators and catalyzers;

(6) Emphasis was placed on keeping the objectives at the forefront, and keeping the meeting moving.

5. Workshop Products

One day after the Workshop, the organizers met to define the schedule for the outputs. They decided that the final maps would be circulated among the organizers and coordinators for comments before publication, and indicated a list of desired products:

(1) Biodiversity Conservation Priorities Map (see Figure 3);
(2) Executive Summary booklet;
(3) Technical Document in book format with thematic reports;
(4) Guide for Workshop Developers;
(5) Papers on Priority Setting;
(6) Electronic Database and Maps;
(7) Training;
(8) Conservation Strategy for Northeast;
(9) Sub-Regional Workshops; and
(10) Other Biome-level Workshops.

6. Current Status

A year after this meeting, several of the products are ready or nearing completion. The biodiversity map has been circulated extensively to decision-makers and participants in several preliminary forms, and is now being printed for large scale distribution. The executive summary information has been incorporated in a poster format, which will be printed on the back of the map. The guide for workshop developers is being edited in a piecemeal format. Several papers on priority setting, including the Atlantic Forest experience are nearing publication by CI and other organizations. The electronic database and maps are available in two sets. One is a ready-to-run slide show with the main workshop maps. The other includes the raw datasets, with maps and tables in CISIG or Arcinfo formats, and databases in dbase or Access format.

The outcomes of this Workshop have been very useful; however, the main success of the Workshop has been in building capacity and decision-making ability at the national and regional level. The sophisticated but fairly inexpensive tools and process used are now in the hands of a number of organizations, with several initiatives being planned in a similar format. The most important is part of the GEF project for biodiversity conservation in Brazil, and comprises a series of within country biome-level priority setting workshops including key aspects of the approach tested at the northeastern Atlantic Forest. This local capacity building, bottom-up component of the Regional Priority Setting Workshop approach is critical, and will be needed in all the signatory nations to the Convention.

IV. CONCLUSIONS

Over the past decade, there have been a number of top-down approaches to setting global biodiversity conservation priorities. These have been useful and effective in guiding funding decisions, especially in the terrestrial realm, but further global level analyses are unlikely to shed much further light on what needs to be done. The real focus now should be to set more specific priorities at the national, regional and local level, and to develop a plausible bottom-up approach to make this possible. The next few years will see a proliferation of efforts by individual nations to set priorities for conserving and sustainably using their biological resources especially as they move to implement the Convention on Biological Diversity. Such efforts will not be successful unless they (1) satisfy the basic need to help policy makers make transparent decisions in the absence of complete information, (2) provide a framework for participation by a broad range of stakeholders and biodiversity experts alike, and (3) make the resulting data available to all interested parties. In this paper, we propose the Regional Priority Setting Workshop, an approach that has been developed and tested over the past five years, as one way to make this possible.

We hope that those concerned with the broad range of biodiversity conservation issues will review this method and consider applying it to the challenges that they face in their own nations and regions.

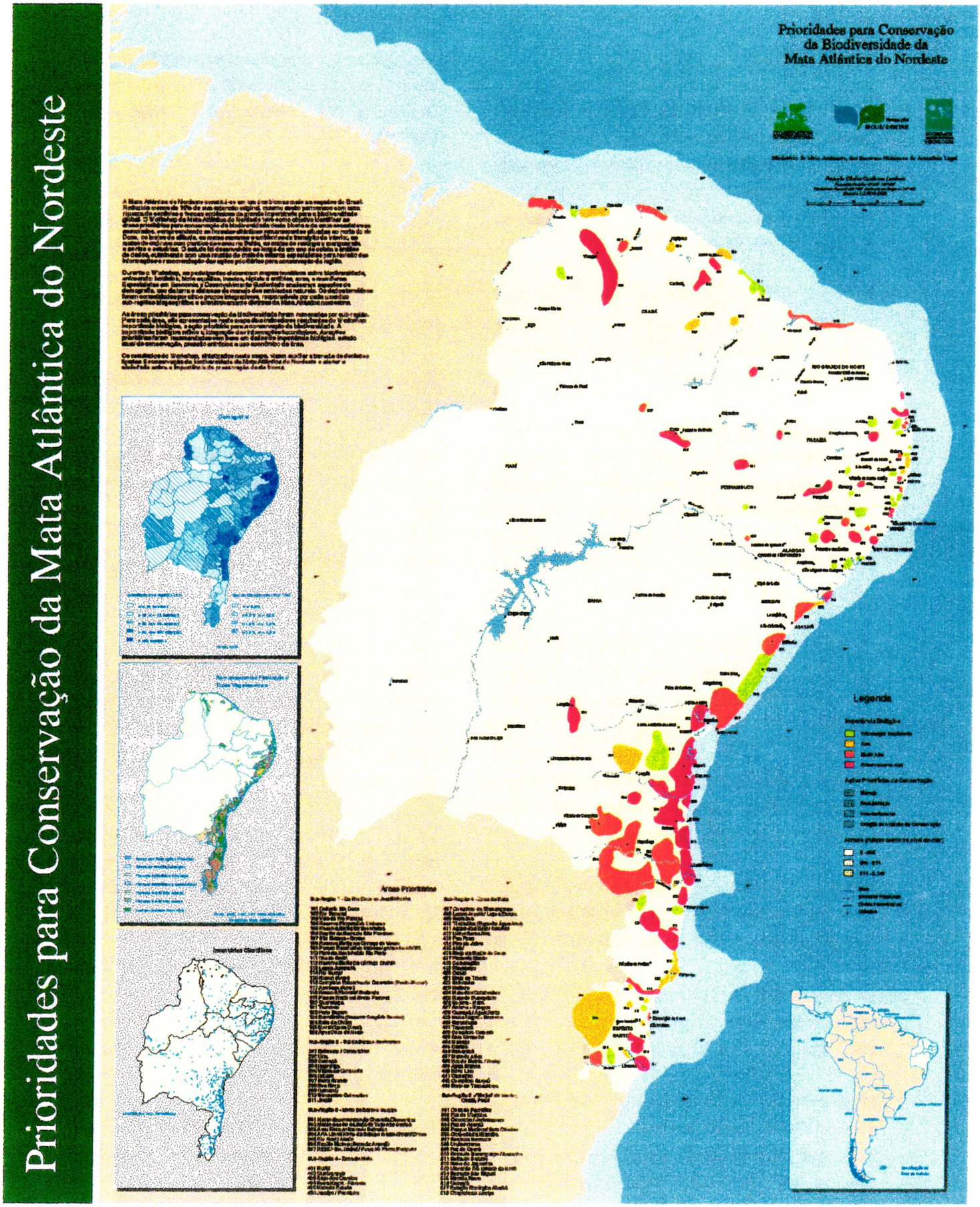
Prioridades para Conservação da Mata Atlântica do Nordeste
Prioridades para Conservação da Biodiversidade da Mata Atlântica do Nordeste
Legenda
Áreas Prioritárias

Figure 3. Biodiversity conservation priorities for the northeast Atlantic Forest.

Literature Cited

Bowles, I.A. and G.T. Prickett. 1994. Reframing the Green Window: An Analysis of the GEF Pilot Phase Approach to Biodiversity and Climate Change and Recommendations for the Operational Phase. Conservation International and the Natural Resources Defense Council, Washington, D.C.

Dinerstein, E. and E.D. Wikramanayake. 1993. Beyond Hotspots: How to Prioritize Investments to Conserve Biodiversity in the Indo-Pacific Region. Conservation Biology **7**:53-65

Ecotrust and Conservation International. 1992. Coastal Temperate Rain Forests: Ecological Characteristics, Status and Distribution Worldwide. Ecotrust and Conservation International, Portland, OR.

Ehrlich, P. R. and J. Holdren. 1971. The impact of population growth. Science **171**:1212-1217.

Hannah, L., D. Lohse, C. Hutchinson and A. Lankerani. 1994. A Preliminary Inventory of Human Disturbance of World Ecosystems. AMBIO **23**:(4-5) 246-250.

ICBP. 1992. Putting Biodiversity on the Map: Priority Areas for Global Conservation. International Council for Bird Preservation, Cambridge, U.K.

Johnson, N., and B. Cabarle. 1993. Surviving the Cut: Natural Forest Management in the Humid Tropics. World Resources Institute, Washington, D.C.

McCloskey, J.M., and H. Spalding. 1989. A Reconnaissance-Level Inventory of the Amount of Wilderness Remaining in the World. AMBIO **18**: 221-227.

Mittermeier, R.A. 1988. Primate Diversity and the Tropical Forest: Case Studies from Brazil and Madagascar and the importance of megadiversity countries. in E.O. Wilson (ed.) Biodiversity. National Academy Press, Washington, D.C.

Mittermeier, R.A. and C. Goettsch de Mittermeier. 1992. La Importancia de la Diversidad Biológica de México. in J. Sarukhan and R. Dirzo (eds.) Mexico Confronts the Importance of Biodiversity. CONABIO, Mexico.

Myers, N. 1979. The Sinking Ark: A New Look at the Problem of Disappearing Species. Pergamon Press, Oxford, U.K.

Myers, N. 1983. A Wealth of Wild Species. Westview Press. Boulder, CO.

Myers, N. 1984. The Primary Source: Tropical Forests and Our Future. W.W. Norton and Co., New York.

Myers, N. 1988. Threatened Biotas: Hot-spots in Tropical Forests. The Environmentalist **8**(3):187-208.

Myers, N. 1990. The Biodiversity Challenge: Expanded Hot-Spots Analysis. The Environmentalist **10**(4):243 -256.

Olson, D.M. and E. Dinerstein. 1993. Assessing Conservation Potential and Degree of Threat Among Ecoregions of Latin America and the Caribbean: a Landscape Ecology Approach. The World Bank: Washington, D.C.

Sisk, T.D., A.E.Launer, K.R. Switky, and P.R. Ehrlich. Identifying Extinction Threats: Global analyses of the distribution of biodiversity and the expansion of the human enterprise. BioScience **44** 9: 592-604

Wilson, E.O. (ed.) Biodiversity. 1988. National Academy Press, Washington, D.C.

Wilson, E.O. 1992. The Diversity of Life. Harvard University, Cambridge, MA.

WCMC. 1994. Priorities for Conserving Global Species Richness and Endemism. WCMC, Cambridge, U.K.

WCMC. 1994. Countries of Ultimate Responsibility: Discussion Paper. WCMC, Cambridge, U.K.

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Conservation International (CI) is dedicated to the preservation of natural ecosystems, particularly the earth's rain forests, and the species that rely on these habitats for their survival.

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